

'PACKAGED' GOVERNMENT RESEARCH AND DEVELOPMENT INFORMATION FOR INDUSTRY

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

Institute For Applied Technology
Office of Technical Resources
WASHINGTON, D.C.



Reviews of Selected Areas of Government R&D

A recently initiated program of the Office of Technical Resources (OTR), Institute for Applied Technology, National Bureau of Standards provides timely information on new Government R&D having significant industrial interest. Such information is condensed into reports called "packages." These highlight key material and amply annotate and code the comments to Government-sponsored reports originating with the Department of Defense, NASA, AEC, and numerous other agencies.

The OTR package program represents one facet of the more general Department of Commerce program for increasing the flow of Government-generated scientific and technical information to the industrial community and the public generally. Subjects selected for coverage arise from various sources: industry, state, and regional groups; research institutions; and Government and internal sources. They include the 26 specific titles which follow and exclude all such broader areas as plastics, textiles, lubricants, and human engineering.

OTR is glad to have suggestions for suitable subjects for other packages as long as they reflect reasonably limited but useful areas of Government-sponsored R&D which could have a wide industrial appeal.

When related to regional needs or programs, all OTR packages may be obtained without charge from OTR itself; otherwise from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151, or from any Department of Commerce Field Office.

The following are brief abstracts of the packages developed since the program's inception in September 1964.

OTR-101 HOT MACHINING reviews significant reports relating to easier and cheaper methods of turning and milling many metals and alloys. Possible improvements in tool life, cutting speeds and costs are noted. Avenues which yielded unsatisfactory results are also mentioned.

OTR-102 NICKEL-TITANIUM ALLOYS is a summary of recent developments in malleable intermetallic compounds for high strength at elevated temperatures, for unique corrosion and wear resistance, and for elastic and damping applications. Strong ductile alloys based on nickel-titanium are of particular interest. Reference to other intermetallic compounds is also included.

OTR-103 PHOTOCHROMISM AND PHOTOTROPISM summarizes the intensive Government R&D programs, both basic and applied, which have resulted in reversible systems for possible use in eye-protective devices, optical memory devices in computers, and modulating or monitoring light valves.

OTR-104 FIRE-EXTINGUISHING MATERIAL TECHNOLOGY covers reports in such areas as water-base materials, powders, foams, combined powders and foams, and gas and propellant fire control. The results of the studies have potential applicability in both product development and hazard control.

OTR-105 FLAME-RETARDANT TEXTILES relates to improved clothing materials which have been developed for use in unusual and ordinarily destructive environments. New techniques such as flame-proofing and melt-proofing have been investigated in connection with the development of protective textiles.

OTR-106 HUMIDITY-CONTROLLED WAREHOUSING discusses R&D on preservation methods and on the economics of storage in a variety of environments. Testing programs related to the storage of food, water, and equipment, and the design of humidity-controlled warehouses are in-

cluded. The research results are of potential value to manufacturers and others seeking to improve the storage life of materials.

OTR-107 CONCRETE TECHNOLOGY is a summary of studies relating to: improving the strength of conventional composition concrete; better shock resistance in lightweight concrete; corrosion protection of steel-reinforced concrete; prestressed concrete applications; and protective coatings for concrete. This research is expected to offer leads to new applications for stronger, more lightweight, more shock-resistant, or less permeable concrete pavements and structures.

OTR-108 VOLATILE CORROSION INHIBITORS covers Government efforts on corrosion control for steel which is protected under a variety of conditions, the effect of inhibitor materials on nonferrous metals, and the use of packaging materials for protective purposes. Volatile corrosion inhibitors may be dissolved in oils, or coated on paper within enclosed shipment parcels or storage spaces, or used as salts. They offer improved corrosion protection of bare steel while in a ready condition for later withdrawal or immediate use.

OTR-109 GREASE LUBRICATION summarizes research pertaining to steel surfaces in contact with lubrication formulations, additives to greases to reduce corrosion, and variations in method and degree of loading and vibration. The results of these studies of lubricant grease are expected to provide useful information to manufacturers seeking to increase the life of steel parts exposed to sliding, rubbing, and rolling friction.

OTR-110 THERMOELECTRIC MATERIALS AND FABRICATION covers new materials, improvement of known thermoelectric materials and material bonding techniques, new testing procedures, and module fabrication methods. Significant results have evolved in each area.

OTR-111 INTEGRATED CIRCUITRY discusses R&D relating to circuit device design, fabrication, and application to electronic systems in terms of the economic and technical factors involved. Consideration is given to costs and process control as well as the reliability of integrated circuits, their performance in systems in comparison to normal circuits, and their environmental protection.

OTR-112 FLUID AMPLIFICATION indicates that fluid amplification is a feasible technique and holds promise for application in extreme environments such as high radiation flux, high temperatures, and shock vibrations. Initial use is expected in military applications where the potential advantages outweigh the development costs.

OTR-113 ULTRASONIC FABRICATION reviews ultrasonic cleaning, welding, and fabrication research. Attention is given to deformation characteristics of metals, applications to wire drawing, rolling and welding of refractory metals, and applications to transistor fabrication.

OTR-114 ULTRASONIC TESTING highlights research efforts in the development of the theory and practice of ultrasonic testing of materials. Major efforts have been directed towards: development of instruments, techniques and standards; application of ultrasonics to the measurement of residual stress and fatigue; and application in the nuclear, plastic and construction fields.

OTR-115 HIGH ENERGY METAL FORMING summarizes efforts directed towards the attainment of the basic parameters of metal performance and their application to high energy metal extrusion and sheet metal forming.

OTR-116 NUMERICAL CONTROLS covers the adaptation of computer control to various manufacturing processes. The investigations cited cover programming for numerical control, tool controlling, retrofitting to numerical controls, evaluating numerical control fabricated forging dies, and other applications of numerical control.

OTR-117 DIELECTRIC FILMS IN MICROELECTRONICS deals with investigations of suitable materials for use as dielectrics; analysis of the parameters involved in attempting to obtain a reproducible process; refinement or development of dielectric fabrication techniques; testing of selected dielectric materials for long time stability; improvements of existing thin film dielectrics; and fabrication of circuits utilizing selected thin film capacitors.

OTR-118 FIBER OPTICS outlines the theoretical advancements which have been made recently. Consideration is given to experimental devices utilizing optical fibers.

OTR-119 HONEYCOMB AND SANDWICH MATERIALS summarizes advances in the manufacturing methods, design, and characteristics of materials used in honeycomb sandwich panels. The reports cover a wide range of uses, from panels for building construction to molybdenum and columbium panels for heat shields and structural applications to aerospace vehicles.

OTR-120 MICROMINIATURE CIRCUIT PACKAGING TECHNIQUES reviews advances relating to conventional or discrete components, thin-film integrated circuits, and monolithic semiconductor integrated circuits. Numerous advancements in the state of the art are noted.

OTR-121 FOAM TECHNOLOGY AND APPLICATION covers foam materials for a variety of applications, including structural members for a number of different types of buildings; thermal barriers; and shock and vibration insulation. Also studied are buoyancy and energy attenuation characteristics. Materials research areas include development of stronger materials, improved energy dissipating properties, more resistance to charring, and better moisture control during manufacture.

OTR-122 DISPERSION-HARDENED METALS AND ALLOYS revolves about the enhancement of the strength properties of metals and alloys.

Various materials were investigated for the matrices and dispersants in the efforts to meet the need for strong lightweight structural materials.

OTR-123 SOLID FILM LUBRICATION covers research on the development and testing of new bulk solid or solid-film lubricant materials for special applications at extreme temperatures and high vacuum, for exposure to radiation, or for minimizing servicing. Considerable attention has also been paid to new lubrication systems and testing equipment.

OTR-124 NONDESTRUCTIVE EVALUATION OF MATERIALS deals with metals and other structural materials. The methods investigated included the use of Hall-effect devices, X-ray, infrared, gamma-ray, ultrasonic, electromagnetic and liquid penetrant techniques. Specimens included metals, alloys, fiberglass, and ceramic coatings.

OTR-125 MICROMINIATURIZATION OF CIRCUIT COMPONENTS discusses the technological programs which contributed to significant reductions in size of discrete conventional components such as resistors, capacitors, inductors, filters, crystal units, and diodes.

OTR-126 ORGANIC SEMICONDUCTORS indicates that R & D in this field has proceeded within certain technical constraints which make it a promising yet rapidly developing field. This survey discusses some of those factors in terms of materials understanding and synthesis. Attention is also given to those developments which have been concerned with the electrical parameter measurements and evaluation of organic semiconductor materials.

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